I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: April 27, 2011
Electronic Signature for Thomas W. Humphrey: / Thomas W. Humphrey /

Docket No.: RSSO-02US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Roy Cooley et al.

Application No.: 10/599,130 | Confirmation No.: 4693

Filed: September 20, 2006 | Art Unit: 1774

For: Method and System for Calculating and Reporting Slump in Delivery Vehicles | Examiner: D. L. Sorkin

DECLARATION OF ERIC P. KOEHLER UNDER 37 C.F.R. 1.132

I, Eric P. Koehler, hereby declare:

1. My name is Eric P. Koehler. I reside in West Chester, Ohio, USA, and I submit this Affidavit in support of patentability of US Patent Application Serial No. 10/599,130 (hereinafter referred to as "the present invention"), originally assigned to RS Solutions LLC.

2. I received a Bachelor of Science degree in Civil Engineering from Clemson University in 2002, as well as Master of Science and Ph.D. degrees in Civil Engineering from the University of Texas at Austin in 2004 and 2007, respectively.

3. I am presently employed as Technology Director for Verifi LLC, a division of W.R. Grace & Co.-Conn., and have held this position since January of 2011. One of my prior relevant positions included being a Senior R&D Engineer for Grace Construction Products, W. R. Grace & Co., Cambridge, Massachusetts (June 2009 to December 2010). I was initially hired in August 2007 by W. R. Grace & Co. as a R&D Engineer for the Concrete Admixture Group of Grace Construction Products. In my duties in these positions, I have studied, and acquired experience and knowledge regarding, rheology, concrete material science, process control and other subjects.

4. During my Master of Science program at the University of Texas at Austin, I worked with several colleagues to develop the ICAR rheometer, which is a portable rheometer for concrete. The ICAR rheometer is now commercially available from Germann Instruments Inc.,

Evanston, IL. My Master of Science thesis was entitled: "Development of a Portable Rheometer for Fresh Portland Cement Concrete".

5. I am the named inventor on a number of relevant published patent applications involving the study of cementitious compositions, including the following:

- PCT/US2010/028207 Mixer Waveform Analysis for Monitoring and Controlling Concrete
- PCT/US2009/053082 Slump Flow Monitoring
- PCT/US2008/059552 Method for Monitoring Thixotropy in Concrete Mixing Drum

6. In addition to my publications in the patent literature, I have presented many scientific papers and have published numerous trade journal and academic essays, addressing various issues of concern to the field of cement and concrete:

Publications:

- Koehler, E., Jeknavorian, A., and Klaus, S. (2010). "Selecting Admixtures to Achieve Application-Required Rheology," *Proceedings of SCC 2010*, Montreal, Canada, September, 2010.
- Koehler, E., Sostaric, J., and Durning, T. (2010). "In-Transit Process Control for Improved Ready Mixed Concrete Performance," *Proceedings of the Transportation Research Board (TRB) Annual Meeting*, January 2010, Washington, DC, USA.
- Koehler, E., Sostaric, J., and Durning, T. (2010). "In-Transit Process Control for Ready Mix Concrete," *Concrete in Focus*, 9(4), July/Aug 2010, pp. 18-20.
- Koehler, E.P., and Fowler, D.W. (2010). "Comparison of Workability Test Methods for Self-Consolidating Concrete," *Journal of ASTM International*. Vol. 7, No. 2.
- Koehler, E.P., Offenberg, M., Malone, J., and Jeknavorian, A. (2009). "Chemical Admixture System for Pervious Concrete," *Proceedings of the 9th ACI International Conference on Superplasticizers and Other Chemical Admixtures in Concrete*. October 13-16, 2009. Seville, Spain.

- Trachet, A., Koehler, E.P, and Fowler, D.W. (2009). "Blended Fine Aggregates in Pavement Concrete," *TRB 88th Annual Meeting Compendium of Papers*, Paper #09-2642, Washington, DC, January 11-15, 2009.

- Jeknavorian, A., Koehler, E.P., Abelleira, A., Geary, D., and Cook. (2009). "Multifunctional Chemical Admixture to Reduce Quality Control Requirements for Self-Consolidating Concrete," *Proceedings of the 9th AC International Conference on Superplasticizers and Other Chemical Admixtures in Concrete.* October 13-16, 2009. Seville, Spain.

- Koehler, E.P., and Fowler, D.W., (2008). "Static and Dynamic Yield Stress Measurements of SCC," *Proceedings of SCC 2008*, Chicago, IL, November 10-12, 2008.

- Jeknavorian, A.J., Koehler, E.P., Geary, D., and Malone, J. (2008). "Concrete Rheology with High-Range Water Reducers With Extended Slump Flow Retention," *Proceedings of SCC 2008*, Chicago, IL, November 10-12, 2008.

- Koehler, E.P., and Keller, L., and Gardner, N.J. (2007). "Field Measurements of SCC Rheology and Formwork Pressures," *Proceedings of the SCC 2007 Conference*, Ghent, Belgium, September 3-5, 2007.

- Koehler, E.P., and Fowler, D.W. (2008). "Dust-of-Fracture Aggregate Microfines in Self-Consolidating Concrete," *ACI Materials Journal*, Vol. 105, No. 2, pp. 165-173.

- Koehler, E.P., and Fowler, D.W. (2007). "Proportioning SCC Based on Aggregate Characteristics," *Proceedings of the SCC 2007 Conference*, Ghent, Belgium, September 3-5, 2007.

- Koehler, E.P., and Fowler, D.W. (2007). "Development of Self-Consolidating Concrete for Prestressed Bridge Beams," American Concrete Institute, *Proceedings of the Session on Self-Consolidating Concrete for Prestressed Concrete Applications*, SP-247-01, pp. 1-16.

- Koehler, E.P., and Fowler, D.W. (2006). "Development and Use of a Portable Rheometer for Concrete," *Supplementary Proceedings of the Eighth CANMET/ACI International Conference on Recent Advances in Concrete Technology*, Montreal, Canada, May 31-June 3, 2006, pp. 53-72.

- Ferraris, C.F., Amziane, S., and Koehler, E.P. (2006). "Concrete mixing trucks and workability," *Concrete Plant International*, Issue 3 (June), pp. 192-197.

- Koehler, E.P., and Fowler, D.W. (2005). "A Portable Rheometer for SCC," *SCC 2005 Conference*, Chicago, IL, October 30-November 2, 2005.

- Amziane, S., Ferraris, C.F., and Koehler, E.P. (2005). "Rheology Measurement of Fresh Concrete with a Mixing Truck," *SCC 2005 Conference*, Chicago, IL, October 30-November 2, 2005.

- Koehler, E.P., Fowler, D.W., Ferraris, C.F., and Amziane, S. (2005). "A New Portable Rheometer for Fresh SCC," *Proceedings: Workability of SCC: Roles of Its Constituents and Measurement Techniques* (ACI SP233CD), New York, NY, April 17-21, 2005.

- Amziane, S., Ferraris, C.F., and Koehler, E.P. (2005). "Measurement of Workability of Fresh Concrete Using a Mixing Truck," *Journal of Research of the National Institute of Standards and Technology*, 110(1), pp. 55-66.

- Beaupre, D., Chapdelaine, F., Domone, P., Koehler, E., Shen, L., Sonebi, M., Struble, L., Tepke, D., Wallevik, O., Wallevik, J.E. (2004). "Comparison of concrete rheometers: International tests at MB (Cleveland OH, USA) in May 2003," Eds. Ferraris, C.F., and Brower, L.E., (NISTIR 7154). National Institute of Standards and Technology, Gaithersburg, MD, 103 pp.

7. The present invention covers technology previously owned and practiced by RS Solutions LLC, which was purchased in December 2010 by W. R. Grace & Co.-Conn. for the commercial value of this technology. The present invention is now owned by Verifi LLC, a wholly owned subsidiary of W. R. Grace & Co.-Conn.

8. From 2008 to 2010, RS Solutions LLC and W.R. Grace & Co.-Conn. operated a joint venture, GR 2008 LLC, to develop next generation process control technology for ready mix concrete trucks. I was personally involved in this joint venture, and in the due diligence to set up the joint venture.

9. The present invention was filed as a patent application prior to the formation of GR 2008 LLC. I had no input in the drafting of the patent application for the present invention. My first involvement was in January 2011 after the acquisition of RS Solutions LLC by W.R. Grace & Co-Conn.

10. I reviewed GB 239502A of Humpish (hereinafter referred to as "Humpish") and GB 2426347A of Humpish et al. (hereinafter referred to as "Humpish et al."), which are cited by the Examiner against the present invention. In the view of my education, studies, research, training, experience, and knowledge, I believe that Humpish and Humpish et al. do not teach,

suggest, or imply that slump or other rheological properties of the concrete can be computed from measurements of the rotational speed of movement of the mixing drum and the hydraulic pressure required to turn the mixing drum over a period of time, nor do they teach adjusting slump or other rheological properties based on these measurements through the addition of water or chemical admixture.

11. In contrast to the current invention, Humpish requires that slump be determined based on a measurement of work and/or concrete weight (claim 1 and 2 of Humpish; 2:14-23 and 2:30-3:2 of Humpish et al.). The term "work" has very specific engineering meaning. For rotational systems, work is defined as:

$$W = \tau \cdot \alpha$$

or

$$W = 1/2 \cdot I(\Delta\omega)^2$$

where:
$W = work$
$\tau = torque$
$\alpha = angular\ displacement$
$I = moment\ of\ inertia$
$\Delta\omega = change\ in\ angular\ velocity$

12. Note that neither of the above equations combine torque and speed. It is generally presumed that the torque to rotate the mixing drum is correlated to hydraulic pressure applied to the mixing drum.

13. The monitoring system of Humpish provides for the determination of both work and weight of the concrete. In contrast, Cooley et al. found that knowledge of weight of the concrete was not necessary to determining slump when both hydraulic pressure and rotational speed over a period of time were considered.

14. Although Humpish describes the monitoring of drum speed and hydraulic pressure, the drum speed is only used to calculate work separately from torque or to perform other functions not related to determining slump.

15. In summary, Humpish and Humpish et al. compute slump based on a measurement of work and/or concrete weight, whereas the present invention computes rheological properties on the basis of rotational speed of movement of the mixing drum and the hydraulic pressure applied to the mixing drum over a period of time. Humpish and Humpish et al. did not anticipate, nor would it be obvious to one skilled in the art, combining measurements of rotational drum speed and hydraulic pressure over a period of time to compute slump or other rheological property, nor to adjusting slump or other rheological properties based on these measurements through the addition of water or chemical admixture.

16. In view of the foregoing passages from Humpish and Humpish et al. and my reasoned conclusions, it is my opinion and belief that Humpish and Humpish et al. do not suggest or imply any motivation for combining rotation speed of movement of a mixing drum and the hydraulic pressure applied to the mixing drum over a period of time to compute rheological properties as claimed in the present invention.

17. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: April 27, 2011

Respectfully submitted,

Electronic signature: /Eric P. Koehler/
Eric P. Koehler